

WHAT IS CLAIMED IS:

1. A creep drive control device that executes, when a driver of a vehicle does not have either one of an intention to accelerate the vehicle and an intention to maintain stopping of the vehicle, at least one of adjustment of a braking force applied to the vehicle and adjustment of a driving force of the vehicle so as to execute control such that a vehicle speed becomes a value within a fixed range.

2. A creep drive control device comprising:

an engine output control unit that controls an engine output in accordance with an engine control amount;

a braking force control unit that controls a braking force applied to each wheel in accordance with a brake control amount;

an acceleration intention determination unit that determines whether a driver has an acceleration intention;

a stop maintenance intention determination unit that determines whether the driver has a stop maintenance intention;

a target creep vehicle speed setting unit that sets a target creep vehicle speed;

a vehicle speed acceleration unit that increases a vehicle speed by at least one of increasing the engine output and decreasing the braking force;

a vehicle speed deceleration unit that decreases a vehicle speed by at least one of decreasing the engine output and increasing the braking force;

a starting assistance control unit which, when respective results of determinations by the acceleration intention determination unit and the stop maintenance intention determination unit are negative, operates using a creep driving mode in which the vehicle speed acceleration unit is operated when the vehicle speed is less than a first target vehicle speed that is smaller than the target creep vehicle speed by a predetermined amount, and in which the vehicle speed deceleration unit is operated when the vehicle speed is larger than a second target vehicle speed that is larger than the target creep vehicle speed by a predetermined amount.

3. The creep drive control device according to claim 2, wherein the acceleration intention determination unit determines that the driver has the acceleration intention when a shift position of an automatic transmission is set to a drive operable position by the driver, and when the acceleration intention determination unit detects at least one of an accelerator opening being equal to a predetermined amount, the vehicle speed being equal to or above a predetermined value, and the drive of the vehicle being controlled by an automatic driving control other

than the control executed by the starting assistance control unit.

4. The creep drive control device according to claim 2, wherein the stop maintenance determination unit determines that the driver has the stop maintenance intention when the stop maintenance determination unit detects at least one of setting of a shift position of an automatic transmission to a drive inoperable position by the driver, execution of a brake operation that generates braking force capable of causing stop maintenance of the vehicle, and execution of an automatic stop control that automatically stops the vehicle.

5. The creep drive control device according to claim 2, wherein the target creep vehicle speed setting unit sets the target creep vehicle speed by correcting a pre-set reference creep vehicle speed in accordance with at least one of a driving state of the vehicle, a road surface condition, and a driving operation of the driver.

6. The creep drive control device according to claim 5, wherein the target creep vehicle speed setting unit executes correction such that the target creep vehicle speed becomes larger as an accelerator opening becomes larger.

7. The creep drive control device according to claim 5, wherein the target creep vehicle speed setting unit executes correction such that the target creep vehicle speed becomes smaller as a brake operation amount becomes larger.

8. The creep drive control device according to claim 5, wherein the target creep vehicle speed setting unit executes correction such that the target creep vehicle speed when the vehicle is moving in a backward direction is smaller than the target creep vehicle speed when the vehicle is moving in a forward direction.

9. The creep drive control device according to claim 5, wherein the target creep vehicle speed setting unit executes correction such that the target creep vehicle speed becomes smaller as a distance becomes smaller between the vehicle and an obstacle in a forward direction of the vehicle.

10. The creep drive control device according to claim 5, wherein the target creep vehicle speed setting unit executes correction such that the target creep vehicle speed becomes larger on a road with a downward gradient, and the target creep vehicle speed becomes smaller on a road with an upward gradient.

11. The creep drive control device according to claim 5, wherein the target creep vehicle speed setting unit executes correction such that the target creep vehicle speed becomes larger in accordance with a length of continuation of a state in which the braking force generated by the braking force control unit is equal to or above a predetermined value.

12. The creep drive control device according to claim 2, wherein the target creep vehicle speed setting unit sets, when a deviation between a present vehicle speed and the target creep vehicle speed is larger than a predetermined value, a new target creep vehicle speed that is the sum of the present vehicle speed and a value that accords with the deviation.

13. The creep drive control device according to claim 2, wherein the vehicle speed acceleration unit increases the vehicle speed by increasing the engine output after decreasing the braking force.

14. The creep drive control device according to claim 2, wherein the vehicle speed deceleration unit decreases the vehicle speed by increasing the braking force after decreasing the engine output.

15. The creep drive control device according to claim 14, wherein the vehicle speed deceleration unit decreases the vehicle speed by decreasing the engine output, and following this, increasing a gear ratio of a transmission.

16. The creep drive control device according to claim 2, wherein the vehicle speed acceleration unit increases the vehicle speed by at least one of setting a second engine control amount with which the engine output is controlled by the engine output control unit as the sum of the engine control amount and an engine control increase amount, and setting a second brake control amount with which the braking force is controlled by the braking force control unit as the brake control amount minus a brake decrease amount.

17. The creep drive control device according to claim 2, wherein the vehicle speed deceleration unit decreases the vehicle speed by at least one of setting a second brake control amount with which the braking force is controlled by the braking force control unit as the sum of the brake control amount and a brake control increase amount, and setting a second engine control amount with which the engine output is controlled by the engine output control unit as the engine control amount minus an engine decrease amount.

18. The creep drive control device according to claim 16, wherein the engine control increase amount and the brake control increase amount are respectively set in accordance with a deviation between the vehicle speed and the target creep vehicle speed.

19. The creep drive control device according to claim 18, wherein the engine control increase amount and the brake control increase amount are respectively corrected in accordance with at least one of a driving state of the vehicle, a road surface condition, and a driving operation of the driver.

20. The creep drive control device according to claim 16, wherein the brake decrease amount is set by correcting an amount that accords with a deviation between the braking force that accords with the brake control amount and a braking force that accords with a brake operation amount, using at least one of an accelerator opening and a road surface coefficient of friction.

21. The creep drive control device according to claim 17, wherein the engine decrease amount is set by correcting an amount that accords with a deviation between the vehicle speed and the target creep vehicle speed, using at least one of a brake operation amount and a road surface coefficient of friction.

22. The creep drive control device according to claim 2, wherein the vehicle speed acceleration unit limits the engine control amount such that the engine control amount is equal to or less than an upper limit value.

23. The creep drive control device according to claim 22, wherein the vehicle speed acceleration unit executes correction of the upper limit value in accordance with at least one of a driving state of the vehicle, a road surface condition, and a driving operation of the driver.

24. The creep drive control device according to claim 16, wherein the vehicle speed acceleration device executes correction such that the engine control increase amount becomes smaller in either one of a case that the vehicle speed is a value proximate to zero, and a case that a gradient of a road surface is a downward gradient.

25. The creep drive control device according to claim 16, wherein the vehicle speed acceleration unit executes correction such that the engine control increase amount becomes smaller in accordance with any one of an accelerator opening becoming smaller, a brake operation amount becoming larger, and a road surface coefficient of friction becomes smaller.



26. The creep control device according to claim 22, wherein, when the engine control amount is limited to being equal to or less than the upper limit value, the vehicle speed acceleration unit suspends engine output control when the vehicle is either one of stationary and moving in a direction opposite to a direction of travel of the vehicle, and along with this, the starting assistance control unit causes the braking force control unit to generate a stop maintenance braking force for stop maintenance of the vehicle.

27. The creep drive control device according to claim 17, wherein the vehicle speed deceleration unit executes correction such that the brake control increase amount becomes larger in accordance with any one of an accelerator opening becoming smaller, a brake operation amount becoming larger, and a road surface coefficient of friction becoming larger.

28. The creep drive control device according to claim 17, wherein the vehicle speed deceleration unit executes correction such that the brake control increase amount becomes larger when a gradient of a road surface is a downward gradient.

29. The creep drive control device according to claim 16, wherein, when the vehicle speed increases following

decrease of the engine output by the vehicle speed deceleration unit, the braking force control unit switches the wheel to which the braking force is applied during a period in which the braking force is applied.

30. The creep drive control device according to claim 16, wherein the braking force control device is provided with a first braking unit that applies braking force to each wheel, and a second braking unit which applies braking force to each wheel independently of the first brake unit, and when the vehicle speed increases following decrease of the engine output by the vehicle speed deceleration unit, the braking force control unit switches between generation of the braking force by the first braking unit and generation of the braking force by the second braking unit, during a period in which the braking force is applied.

31. The creep drive control device according to claim 2, wherein the starting assistance control unit causes the engine control amount to change such that the engine control amount agrees with an amount that accords with an accelerator pedal operation amount of the driver, when the creep driving mode is completed.

32. The creep drive control device according to claim 2, wherein the starting assistance control unit causes the brake control amount to change such that the brake control amount agrees with an amount that accords with a brake pedal operation amount of the driver, when the creep driving mode is completed.